

## Active Combustion Control Valve, Phase II

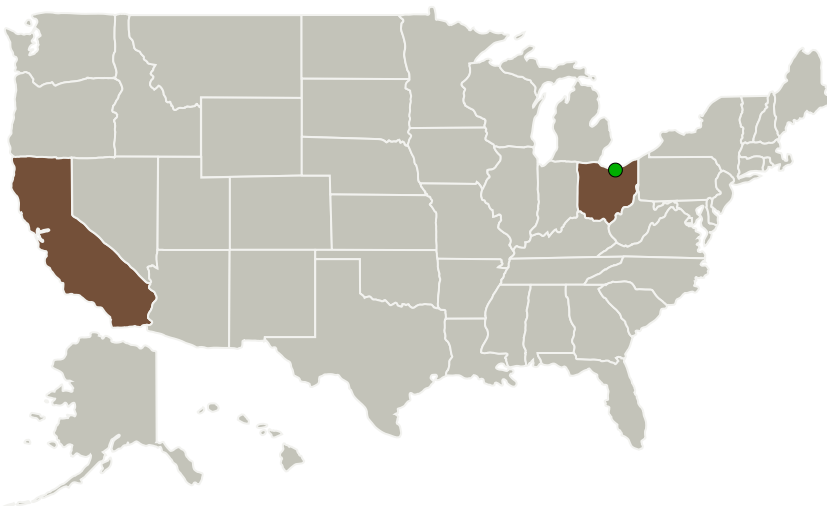
Completed Technology Project (2014 - 2016)



## Project Introduction

Over the past decade, research into active combustion control has yielded impressive results in suppressing thermoacoustic instabilities and widening the operational range of gas-turbine combustors. Active Combustion Instability Control (ACIC) controls the combustion process such that the heat release profile is modulated to dampen the naturally occurring thermoacoustic instabilities. A major challenge to effective implementation of active combustion control is the availability of valves and actuators that provide adequate flow modulation control authority. The majority of the published work revolves around valves designed to modulate the main combustor flow. At present these valves are not designed to operate in a harsh environment and as such are required to be located outside the main flow path, reducing their control authority. To effectively meet the challenge, valves and sensors that are smaller, more responsive and robust must be developed. Ultimately the control valves are co-located with the fuel injection manifold. The trade-off for the harsh environment operation is the ability to maximize the flow modulation control authority. The objective of this research is to integrate the required control authority into an operational environment. This research continues the development of a light weight fast-acting fuel control valve for harsh environment operation. In the Phase 1 effort, the valve demonstrated the ability to modulate fluid flow at 1,000 Hz. This demonstrated the valve will allow the precise time dependent fuel control required for lean-burn combustor operability. In this Phase II research a Prototype valve is designed, fabricated and flow tested using commercially-available driver circuitry to demonstrate valve operation in harsh thermal environments.

## Primary U.S. Work Locations and Key Partners



## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	1
Project Transitions	2
Images	2
Technology Maturity (TRL)	2
Technology Areas	2
Target Destinations	2

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

WASK Engineering, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

*Continued on following page.*

## Active Combustion Control Valve, Phase II

Completed Technology Project (2014 - 2016)



Organizations Performing Work	Role	Type	Location
WASK Engineering, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Cameron Park, California
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

## Primary U.S. Work Locations

California	Ohio
------------	------

## Project Transitions

**April 2014:** Project Start**September 2016:** Closed out**Closeout Summary:** Active Combustion Control Valve, Phase II Project Image**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/137584>)

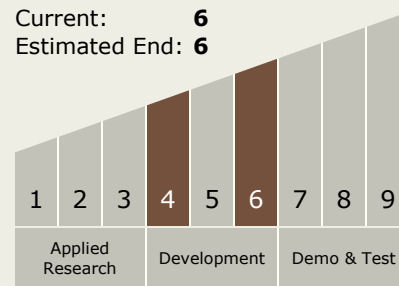
## Images

**Briefing Chart Image**Active Combustion Control Valve,  
Phase II(<https://techport.nasa.gov/image/126586>)Project Management  
(cont.)**Principal Investigator:**

Wendel M Burkhardt

Technology Maturity  
(TRL)

Start: 4  
Current: 6  
Estimated End: 6



## Technology Areas

**Primary:**

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.1 Integrated Systems and Ancillary Technologies

## Target Destinations

The Sun, Earth, The Moon,  
Mars, Others Inside the Solar  
System, Outside the Solar  
System